

1 Amendments to the drawings

2 Please replace sheet 1 of the drawings with the attached "REPLACEMENT
3 SHEET".

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Amendments to the Specification

The text of the Specification has been amended as indicated above. Specifically, the paragraphs beginning at page 3, line 2 and page 3, line 5, respectively, have been amended to correct minor spelling errors – each occurrence of the word “Brilluoin” has been replaced with the word “Brillouin”. Also, the paragraph beginning at page 5, line 34 has been amended to correct a minor typographical error – the reference to element number “20” has been corrected to “110”, as it pertains to the description of Fig. 11. No new matter has been introduced by way of the amendments to the Specification.

Objections to the Drawings

Figs. 2 and 11 of the Drawings have been objected to for failing to comply with 37 CFR 1.84(p)(4) (page 2 of Office action). In particular, Fig. 2 (as originally filed) includes the reference characters "3" and "21" used in duplicative manner. In turn, Fig. 11 (as originally filed) includes the reference characters "3" and "21" used in duplicative manner, and further includes the reference characters "4" and "111" used in duplicative manner.

In accordance with 37 CFR 1.121(d), an amended replacement drawing sheet (sheet 1) is submitted herewith, including the words "REPLACEMENT SHEET" in the header portion. Therein, Fig. 2 has been amended by deletion of the reference characters "3" and their associated lead lines. Also, Fig. 11 has been amended by deletion of the reference characters "3" and "4", as well as their associated lead lines. The amendments to the drawings are supported at least by the text at page 4, line 32 to page 5, line 5 and at page 5, line 34 to page 6, line 11 of the Specification. An "Annotated Sheet" in compliance with 37 CFR 1.121(d)(1) is also attached

1 hereto, showing the corrections to Figs. 2 and 11. No new matter has been added
2 by way of the amendments to the Drawings.

3 4 Amendments to the Claims

5 Claims 21 and 35 have been amended, and claims 22 and 25-26 have been
6 cancelled as respectively indicated above. Also, new claims 41-43 have been added
7 as indicated above. Specifically, independent claim 21 has been amended to recite
8 particular features and limitations of the present subject matter that are not provided,
9 taught nor suggested by the art of record. Also, claim 35 has been amended to
10 correctly recite dependence from claim 33.

11 Support for the amendments to the claims, as well as for new claims 41-43,
12 can be found at least on page 2, line 6 to page 10, line 2 of the Specification as
13 originally filed. No new matter has been introduced through the amendments to the
14 claims.

15 16 Rejection of Claims under 35 U.S.C. § 103

17 Claims 21-26, 29-35 and 38-40 have been rejected under 35 U.S.C. § 103(a)
18 as being unpatentable over U.S. Patent No. 6,563,995 ("Keaton"), in view of *Single-*
19 *Polarisation Operation of Highly Birefringent Bow-Tie Optical Fibers* ("Varnham et
20 al.").

21 The Applicants respectfully disagree that claims 21-26, 29-35 and 38-40, as
22 respectively amended, are obvious over Keaton in view of Varnham et al.

23 As a starting point, MPEP 706.02(j) states:

24 "[t]o establish a *prima facie* case of obviousness, three basic
25 criteria must be met. First, there must be some suggestion or
motivation, either in the cited references themselves or in the
knowledge generally available to one of ordinary skill in the art, to

1 modify the reference or to combine the reference teachings. Second,
2 there must be a reasonable expectation of success. Finally, the prior
3 art reference (or references when combined) must teach or suggest
4 all the claim limitations. The teaching or suggestion to make the
5 claimed combination and the reasonable expectation of success must
6 both be found in the prior art and not based on applicant's disclosure."
7 (Emphasis added.)
8

9 Hereinafter, the Applicants will provide arguments in favor of independent
10 claims 21, as amended. It is axiomatic that any claim depending from an allowable
11 base claim is itself allowable. Therefore, the Applicants do not believe it necessary
12 to provide particular arguments in favor of each of claims 22-26, 29-35 and 38-40
13 (as respectively amended), as those claims depend, directly or indirectly, from
14 independent claim 21, as amended.
15

16 Claim 21

17 In regard to claim 21, that claim, as amended, recites the following features
18 and limitations:
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20 Apparatus comprising an optical fibre having a waveguide and
21 at least one stress applying region, wherein:

22 the waveguide is defined by a numerical aperture;

23 the stress applying region is defined by a depressed refractive
24 index;

25 the optical fibre is configured such that the waveguide supports
at an operating wavelength at least two polarised fundamental modes,

1 two polarised first second-order modes, and two polarised second
2 second-order modes;

3 the waveguide comprises a gain medium;

4 the optical fiber is disposed in a bend; and

5 the stress applying region, the waveguide, the disposition of the
6 gain medium, and the bend of the optical fiber are such:

7 as to provide preferential guidance to at least one of the
8 modes at the operating wavelength;

9 the two polarised first second-order modes and the two
10 polarised second second-order modes are leaky at the
11 operating wavelength; and

12 the optical fibre operates as a single polarisation optical
13 fibre at the operating wavelength.

14 (Emphasis added.)

15
16 Keaton fails to teach or suggest an optical fibre configured such that the
17 waveguide supports at an operating wavelength at least two polarised fundamental
18 modes, two polarised first second-order modes, and two polarised second second-
19 order modes, as recited in combination with the other features and limitations of
20 claim 21, as amended. Also, Keaton fails to teach or suggest an apparatus wherein
21 the stress applying region, the waveguide, the disposition of the gain medium, and
22 the bend of the optical fiber are such as to provide preferential guidance to at least
23 one of the modes at the operating wavelength, as recited in combination with the
24 other features and limitations of claim 21, as amended. Further, Keaton fails to
25 teach or suggest an apparatus wherein the stress applying region, the waveguide,
the disposition of the gain medium, and the bend of the optical fiber are such [that]
the two polarised first second-order modes and the two polarised second second-

1 order modes are leaky at the operating wavelength, as recited in combination with
2 the other features and limitations of claim 21, as amended. Further still, Keaton fails
3 to teach or suggest that an apparatus wherein the stress applying region, the
4 waveguide, the disposition of the gain medium, and the bend of the optical fiber are
5 such [that] the optical fibre operates as a single polarisation optical fibre at the
6 operating wavelength, as recited in combination with the other features and
7 limitations of claim 21, as amended.

8 Rather, Keaton is directed toward an optical fibre that is configured to guide
9 fundamental modes at a wavelength λ_1 and have high attenuation for the [two]
10 fundamental modes at a wavelength λ_2 . Keaton teaches that this is achieved by
11 engineering a W-profile (14) to have a fundamental cut-off wavelength λ_c such that
12 light in the fundamental mode at λ_1 is retained in core (12), while light in
13 fundamental mode at λ_2 is lost to secondary cladding (18) over a short distance
14 (Col. 6, line 66 to Col. 7 line 4 of Keaton). Keaton further teaches that such is
15 accomplished by "appropriately engineering the W-profile rather than bending the
16 fiber 10 or performing other mechanical adjustments" (Col. 7, lines 4-6 of Keaton).
17 In any case, however, Keaton fails to teach or suggest at least the features and
18 limitations specifically described above, as recited by claim 21, as amended.

19 Varnham et al. fail to cure the deficiencies of Keaton. In particular, Varnham
20 et al. fail to teach or suggest an optical fibre configured such that the waveguide
21 supports, at an operating wavelength, at least two polarised fundamental modes,
22 two polarised first second-order modes, and two polarised second second-order
23 modes, as recited in combination with the other features and limitations of claim 21,
24 as amended. Also, Varnham et al. fail to teach or suggest an apparatus wherein the
25 stress applying region, the waveguide, the disposition of the gain medium, and the
bend of the optical fiber are such as to provide preferential guidance to at least one
of the modes at the operating wavelength, as recited in combination with the other

1 features and limitations of claim 21, as amended. Further, Varnham et al. fail to
2 teach or suggest an apparatus wherein the stress applying region, the waveguide,
3 the disposition of the gain medium, and the bend of the optical fiber are such [that]
4 the two polarised first second-order modes and the two polarised second second-
5 order modes are leaky at the operating wavelength, as recited in combination with
6 the other features and limitations of claim 21, as amended. Further still, Varnham et
7 al. fail to teach or suggest that an apparatus wherein the stress applying region, the
8 waveguide, the disposition of the gain medium, and the bend of the optical fiber are
9 such [that] the optical fibre operates as a single polarisation optical fibre at the
10 operating wavelength, as recited in combination with the other features and
11 limitations of claim 21, as amended.

12 The Applicants assert that there is no motivation to be found in either Keaton
13 or Varnham et al. to combine the teachings (generally or selectively) in order to
14 arrive at the subject matter recited by claim 21, as amended. The Applicants believe
15 that the following Table 1 helps to clarify at least some of the differences between
16 Keaton and Varnham et al., and the subject matter as recited by claim 21, as
17 amended:

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TABLE 1			
Feature or Limitation	Claim 21, as amended	Keaton	Varnham et al.
Optical fibre waveguide supports, at an operating wavelength, at least two polarised fundamental modes, two polarised first second-order modes, and two polarised second second-order modes	YES	No	No
Stress applying region, waveguide, gain medium, and bend of the optical fiber provide preferential guidance to at least one of the modes at the operating wavelength	YES	No	No
Stress applying region, waveguide, gain medium, and bend of the optical fiber are such that the two polarised first second-order modes and the two polarised second second-order modes are leaky at the operating wavelength	YES	No	No
Stress applying region, waveguide, gain medium, and bend of the optical fiber are such that the optical fibre operates as a single polarisation optical fibre at the operating wavelength	YES	No	No

In consideration of Table 1 above, and the foregoing arguments in support thereof, there is no way to select elements from Keaton, and then to somehow combine those elements with other elements selected from Varnham et al., in order to arrive at the subject matter recited by claim 21, as amended, as no possible combination of Keaton and Varnham et al. teaches or suggests all of the required features and limitations. In view of the deficiencies of Keaton and Varnham et al. (individually and collectively), and in further view of the requirements of MPEP 706.02(j), the Applicants assert that the §103 rejection of claim 21 (as amended) is unsupportable and must be withdrawn.

1 For at least the foregoing reasons, the Applicants assert that claim 21, as
2 amended, is allowable. As claims 23-24, and 27-43 (as respectively amended)
3 depend (directly or indirectly) from claim 21, as amended, it is axiomatic that those
4 claims are also allowable at least by virtue of their dependence from an allowable
5 base claim, as well as for their own respectively patentable features and limitations.
6

7 Allowable Subject Matter

8 The Examiner has indicated that claims 27, 28, 36 and 37 are objected to as
9 being dependent upon a rejected base claim, but would be allowable if each were
10 rewritten in independent form including all of the limitations of the base claim and
11 any respective intervening claims (page 6 of Office action). As indicated above, the
12 Applicants believe that claims 27, 28, 36 and 37 are allowable at least by virtue of
13 their dependence (directly or indirectly) from allowable claim 21, as amended.
14

15 Supplemental Information Disclosure Statement

16 A Supplemental Information Statement under 37 CFR 1.97(c)(2) is enclosed
17 herewith, along with the required fee under 37 CFR 1.17(p).
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The Examiner is respectfully requested to contact the below-signed representative if the Examiner believes this will facilitate prosecution toward allowance of the claims.

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A diagram of a cell with the following labels: 1 points to the outer boundary (cell membrane); 2 points to the central circular structure (nucleus); 3 points to a shaded, bean-shaped structure (mitochondrion); 4 points to the inner circular structure (nucleolus); 5 points to the space between the nucleus and the cell membrane (cytoplasm); 6 points to the outer boundary of the nucleus (nuclear envelope); 7 points to the inner boundary of the nucleus (nuclear pore).

Diagram illustrating two types of Helium-11 ions:

- HE_{11}^x (Left): A circle with an upward-pointing arrow, labeled 31.
- HE_{11}^y (Right): A circle with a rightward-pointing arrow, labeled 32.

A diagram of a circular device, labeled 110, showing two shaded regions, 21, and two small circles, 111. The device is divided into two halves by a vertical line, 22. The top half is labeled 23. Arrows labeled "delete" point to the shaded regions 21 and the small circles 111.

A schematic diagram of a stepped profile. It consists of a horizontal line at the top, a series of downward steps, and a horizontal line at the bottom. The labels point to specific features: 120 points to the top horizontal line, 121 points to the top horizontal line of the first step, 122 points to the vertical edge of the first step, and 123 points to the bottom horizontal line.